

**DOCKETED**

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**RPS-21-02 Separation, Circuits, Cycles, Real and Apparent Power**

*Additional submitted attachment is included below.*

## **RPS-21-02 Separation, Circuits, Cycles, Real and Apparent Power**

Points to consider when diagramming circuit connection and metering for use of battery storage and alternating current power production for credit in the California Renewables Portfolio Standard Program.

### **Separation**

Electrons were first in social distancing each other in the Universe.

Electrons carry a negative electrical charge.

Electrons are free to move about, if allowed.

Electrons will drive away other electrons.

Electrons are attracted to protons.

Electrons will even up with protons if allowed.

Whenever there's a difference in the number of electrons and protons, electrons will move to even things up.

Electrons conduct the electromotive force we know as electricity when a circuit is closed and a load is provided power to operate.

Electrons are not electricity products that are bought and sold on the grid.

### **Circuits**

If a diagram for connection of battery storage and alternating current power production output indicates use of separate circuits, the battery will charge from the input circuit and the alternating current power output will travel on the output circuit and will not return to charge the battery. Two meters are required to account input and output power flow allowing loss accounting.

### **Cycles**

If a diagram for connection of battery storage and alternating current power production output indicates the use of one circuit and meter, charging of the battery and alternating current power production has to happen in cycles, otherwise alternating current power output supplied by the battery will return to charge the battery. A meter that keeps separate account of input and output power flow will allow loss accounting between battery charging and alternating current power output.

## Real and Apparent Power

Real power is the power actually consumed due to resistive load, apparent power is the power the grid must be able to withstand.

The unit of real power is watt.

The unit of apparent power is volt ampere.

Pursuant to Public Utilities Code - PUC 399.12. (h) (1), "Renewable energy credit" means a certificate of proof associated with the generation of electricity from an eligible renewable energy resource, issued through the accounting system established by the Energy Commission pursuant to Section 399.25, that one unit of electricity was generated and delivered by an eligible renewable energy resource.

Public Utilities Code - PUC 399.12. (h) (1) speaks of one unit of electricity was generated and delivered by an eligible renewable energy resource. The unit is not defined. The use of volt amperes to identify the advantage of placement of battery storage is not prohibited in the California Renewables Portfolio Standard Program.

Battery storage can improve power factor. Power factor is the ratio of real to apparent power. Remember, apparent power is the power the grid must be able to withstand, real power is the power actually consumed due to resistive load. Correcting power factor to be closer to unity reduces the power the grid must be able to withstand.

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p.s.

View the below video for more detail about real and apparent power.  
<https://youtu.be/ouT0VcEfkCw?t=735>

